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TEMPORAL SETTING AND JUDGMENT UNDER UNCERTAINTY

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13. ABSTRACT

In a series of experiments, subjects judged the likelihood of events set either in the past or the future. No consistent differences were found in either the central tendency or the dispersion of subjects' likelihood judgments regarding past and future events which differed solely in their temporal setting. Temporal setting was, however, found to affect the production of possible event outcomes. These results contradict a "sure past" hypothesis, which has been advanced by a number of observers according to which judges are more confident in dealing with past than future events. They also eliminate a possible source of methodological difficulty in existing judgmental studies and provide some insight into the use of judgmental heuristics. Belief in the "sure past" hypothesis is discussed as the result of confusion between temporal setting and its ecological correlates.

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OREGON RESEARCH INSTITUTE

TEMPORAL SETTING AND JUDGMENT

UNDER UNCERTAINTY

Baruch Fischhoff

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Temporal Setting and Judgment Under Uncertainty

Are likelihood judgments affected by the temporal setting of
the events being judged; i.e., by whether those events are set in the past
or future? Aside from its obvious substantive interest for the psychology
of time and the study of judgment, the answer to this question has methodo-
logical implications for both fields.

Research in judgment has typically ignored the temporal setting of the
stimuli used in experimental tasks. A substantial temporal setting effect
would suggest a need to review existing findings with an eye to the setting
of the stimuli used, and at the extreme, the development of distinct psy
chologies of predictive and postdictive judgment. Similarly, students of
personal time perspectives (e.g., Bortner & Hultsch, 1972) have typically
assumed that the past-future differences which they have observed are
exclusively due to changing personal and social realities. Reinterpretation
of their results would clearly be called for if temporal setting alone were
found to affect judgment.

Considering the many ways in which people's perceptions of past and
future events have been found to differ (e.g., Bratfisch, Ekman, Lundberg, &
Kruger, 1971; Cohen, 1967; Ekman & Lundberg, 1971; Koriat & Fischhoff,
1974), an effect of temporal setting on judgment seems far from implausible.
Although this possibility has drawn little attention from psychologists,
it has been considered by philosophers and others concerned with the study
of history. Probably the most frequently raised contention in this primarily
anecdotal literature is that judges are more confident in dealing with past

than with future events. Perhaps the most succinct expression of this "sure past" hypothesis may be found in Seignobos and Langlois' classic historiographic text, Introduction to the Study of History (1898):

> The natural tendency is to forget in [the] reconstruction [of past events] the results yielded by [scholarly] criticism, to forget the incompleteness of our knowledge and the element of doubt in it. An eager desire to increase to the greatest possible extent the art of our information and the number of conclusions impels us to seek emancipation from all negative restrictions. We thus run a great risk of using fragmentary and suspicious sources of information for the purpose of forming general impressions just as if we were in possession of a complete record. (p. 281)

Similar sentiments are readily found elsewhere (e.g., Ayer, 1956; De Jouvenal, 1967; Kissinger, Note 1; Peirce, cited in Danto, 1965; Polak, 1965; Toffler, 1970).

The source of reported differences in the judgment of past and future events is, however, often unclear. In each of the cases cited above (see also Doob's, 1970, compendium), the change in the temporal setting of the events in question is confounded with other changes likely to affect judgment.

One frequent source of confounding is that the sets of past and future events being judged contain markedly different members. Different events should, reasonably, be judged differently. Even when similar events are being considered, the judges involved frequently possess outcome knowledge about the past, but not about the future events; i.e., they know how the

former turned out. Such additional information could reasonably affect

their perceptions. Although frequent, this latter type of confounding is

by no means necessary. There are past events whose outcome is unknown

and future events whose outcome is a foregone conclusion.

Even similar past and future events about which equal information is

available may be judged differently for reasons unrelated to their temporal

setting. Consider, for example, how the following events change in meaning

if they are set twenty years ago or twenty years hence: a trip to your

dentist, a parade of lesbians in the streets of New York, an earthquake on

Alaska's North Slope, writing your New Year's resolutions, or being unhappily

married in Italy (before or after enactment of the divorce law).

It is, of course, not changes in temporal setting which are responsible

for these changes in meaning, but contemporaneous changes in relevant social

and personal realities. The world will be different in 1995 than it was

in 1955 and we, ourselves, will be different people in it. Temporal

relocation is no more responsible for changes in a mismatched Italian

couple's prognosis than geographical relocation per se would be responsible

for changes due to shifting the setting from Italy to New York.

The present study asks whether likelihood judgments for past events

differ from those for otherwise similar future events, with all these

sources of confounding undone. Subjects in Past and Future groups were

presented with identical descriptions of events and asked to judge the

likelihood of possible subsequent developments, or "outcomes." For Past

subjects, the evaluated outcomes were set in the past; for Future subjects,

they were set in the future. These events were constructed so that temporal

setting-related changes in meaning were minimal.

Formally, deductive inferences of this type are invariant with regard
to the temporal setting of the outcome judged. Thus, it should make no
difference to the judge whether the fate of a possible outcome (its occurrence
or non-occurrence) has already been decided (past events) or has yet to be
decided (future events)--unless, of course, temporal setting alone affects
his perception.

Two explicit hypotheses were tested: (a) past events are judged to be
more likely than equivalent future events; and (b) past events are judged
more ex'remely than equivalent future events. The former might be called
the "likely past" hypothesis, H_1, and the latter, the "extreme past" hypo-
thesis, H_e. H_1 refers to an increase in the central tendency of likelihood
judgments for past events; H_e refers to an increase in the dispersion of
likelihood judgments for past events. They e examined with outcomes
provided both by the experimenter (Experiment 1) or by the judge himself
(Experiment 2).

Experiment 1

Method

Design. In order to assess the effect of temporal secting on judgment,
subjects were asked to evaluate the likelihood of a series of fifteen event
outcomes, each in the light of an accompanying event description. These
outcomes were set either in the past or future. The event descriptions were
always set in the past. One outccme was evaluated for each event description.
A specimen event description is:

A French artist, Dollard St. Laurent, recently submitted a claim
to the government patent office. In this claim, he demanded a patent
for his artistic style. St. Laurent is a well-known figure in
opposition circles.

The corresponding Past outcome question was:

In the light of these data, what, in your opinion, are the chances
that he received a patent?

The corresponding Future outcome question was:

In the light of these data, what, in your opinion, are the chances that
he will receive a patent?

In Experiment 1a, Past-Future differences were minimal, frequently
amounting to no more than a change in a single verb (as in the examples
given). No mention of temporal setting appeared in the instructions.
Experiment 1b was identical to Experiment 1a except that the strength of the
manipulation was increased by a change of instructions and by adding details
which included time-related references. For example, the outcome presented
above was changed from ". . . he (the French artist) received a patent"
to ". . . he received a patent, and his success began a wave of similar
claims for receipt of patents from known and unknown artists alike."

Stimulus construction. The event descriptions dealt with a variety
of reasonably interesting content areas. The adjoining outcomes were
selected to evoke a full range of responses, from very likely to very un-
likely, over tasks. Several additional examples appear in Table 1. Nine

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Insert Table 1 about here
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of the 15 event descriptions which produced greatest inter-subject agreement within
groups and greatest inter-subject disagreement between groups in Experiment 1a
were reused.

The success of the experimental manipulation depends, of course, on the independence of temporal setting changes from changes in accompanying social realities. Among the precautions taken to guarantee this independence were: (a) specifically setting events and outcomes in the near future or recent past to eliminate possible differences caused by secular trends, such as a rising crime rate or increasing sexual freedom; and (b) attempting to equate the past and future time periods between the event and outcome, in case probability of occurrence was related to the length of time allotted. Each event appeared on a separate page. The different events were collated into booklets with a standard order which varied the likelihood of sequential outcomes.

Procedure. For each of the two experiments, the test booklets were distributed to a single class of subjects from a pile in which booklets belonging to the two conditions alternated. Given the minimal differences between the versions and the minimum of disturbance during the administration, there is little reason to believe that subjects were aware of the differences. This procedure allowed distribution of the booklets to a fairly homogeneous group of subjects in an unsystematic fashion ensuring fairly equal numbers of subjects in each experimental condition.

Instructions. In Experiment 1a, where every effort was made to obscure the temporal setting variable, the general instructions were identical for all conditions. They read, "A number of short descriptions of social and personal events appear below. Some are factual, others imaginary. For each description you will be asked to evaluate the likelihood of a possible outcome

in the light of the data. Indicate your answer with an 'X' in the appropriate space." The twenty-one point response scale was labelled at three points: 20 = greatest possible chances; 10 = medium chances; 0 = least possible chances. All instructions and materials were in Hebrew.

For Experiment 1b, they were changed to read: "A number of descriptions of social and/or personal events which recently occurred (are about to terminate—for Future subjects) appear below. For each description, you will be asked to evaluate the chances that the event terminated (will terminate) in a particular fashion."

Subjects. For Experiment 1a, the subjects were 48 students in an Introductory Statistics class at the University of the Negev, Beer-Sheba, Israel, with 24 in each group. For Experiment 1b, the subjects were 82 students in an Intermediate Statistics class at the University of the Negev; 40 were in the Past group and 42 in the Future group.

Results

H_1. Two measures used both here and in Experiment 2 are the "overall median response" and the "median median response." The former is the median of all responses by all subjects in a condition. The latter is computed by finding the median of each individual subjects' 9 or 15 likelihood judgments and then finding the median of these medians. The median median is free of the intra-subject dependence found in the overall median (to which each subject contributed 9 or 15 responses).

The "likely past" hypothesis predicts higher likelihood assignments to past outcomes. For both experiments, overall medians and median medians were identically 10 for all conditions. Nor was there any tendency for Past

outcomes of individual events to be judged more likely than the corresponding

Future outcomes.

H_e. The "extreme past" hypothesis predicts the assignment of more

extreme (i.e., more disperse) likelihood values to Past outcomes. The mean

(absolute) deviation of each subject's responses from his median likelihood

assignment was calculated. The means of these mean deviations appear in

Table 2. Contrary to H_e, there is no appreciable difference in the dispersion

of Past and Future likelihood responses. Nor were there any consistent

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Insert Table 2 about here
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differences in the extremity (distance from 10) of the median likelihood

assignments to the Past and Future outcomes of individual events.

Discussion

Temporal perspective clearly fails to affect either the central tendency

or the dispersion of likelihood judgments on the tasks used in Experiments 1a

and 1b. If not completely illusory, the temporal setting effect must be

sought in more restricted and more carefully specified circumstances. One

aspect of the present task which could have obscured such an effect is the

fact that subjects evaluated outcomes which they themselves had not produced.

Possibly, the act of production, absent in these experiments, elicits or

focuses attention upon critical differences between prediction and postdiction,

while the temporal setting of prepared outcomes is ineffectual. An analogy

with some appeal might be a difference between past (historical) and future

(science) fiction. Production of the two may evoke and require rather different

"frames of mind." Once produced by others (authors), however, examples of

both genres may be judged in much the same fashion by readers. Indeed, in

an unpublished study, Condry (Note 2; cited in Toffler, 1970) did find

differences in the length and imaginativeness of past and future outcomes

which subjects had produced. Tversky and Kahneman (1973) have both hypothesized

and shown that likelihood judgments may depend upon ease and conditions of

outcome production, with more available outcomes judged more likely. Thus,

any temporal setting effect on production could lead to changes in likelihood

judgments.

Experiment 2 was designed to explore the possibility that outcome pro-

duction is necessary to evoke temporal setting-related differences in judg-

ment.

Experiment 2

Method

Design. For each of several event descriptions, subjects were asked to:

(a) produce a number of possible outcomes, and (b) evaluate the likelihood

of each outcome produced on a scale from 0 to 20. The Past group was asked

to.produce outcomes which may have happened, the Future group to produce

outcomes which possibly will happen. The event descriptions were identical

for both groups.

As little is known about how the conditions under which outcomes are

produced affect the way in which their likelihood is judged, several variations

on this basic design were included. In Experiments 2a and 2b subjects were

instructed to produce as many outcomes as possible; in Experiment 2c to

produce a fixed number of outcomes (four)--in the event that there were

effects which only emerge or vanish when subjects have exhausted their

imaginations for possible outcomes. Experiments 2a and 2b differed in the number of possible outcomes which subjects could have produced, considering the nature of the event in question. In Experiment 2a, this number was extremely large (i.e., very many things could happen), whereas in Experiment 2b no more than ten or twelve outcomes were possible. It was thought that the size of the set of possible outcomes might affect subjects' outcome production and evaluation prosesses.

Each event appeared on a separate page. For Experiments 2a and 2b, there were 12 numbered spaces for inserting and evaluating outcomes, along with unnumbered space for an additional five or six outcomes. Following the instructions was a sample problem for which two possible outcomes were affixed (in the proper tense) with likelihood estimates obtained from an informal poll of ten students. The order of the events was randomized in test booklets.

Stimulus construction. One of the event descriptions used in Experiment 2a was:

A well-known sculptor returned to his studio following a short vacation and found that his former wife had burst into his studio during his absence and destroyed statues which constituted all of his work for a period of more than a year.

The second event was a Hebrew adaptation of that used by Condry (Note 2) and concerned parents' handling a problem confronted by their adopted daughter; the third appeared in Experiment 1 and dealt with a family crisis. Two examples of the event descriptions used in Experiments 2b and 2c appear in Table 1.

The events used in Experiment 2b also appeared in Experiment 2c. In Experiments 2a and 2b subjects responded to three different event descriptions, in Experiment 2c to seven. Each spent approximately a half an hour at the task.

Procedure. Same as Experiment 1.

Subjects. Sixty undergraduates in an Introductory Psychology class at the Hebrew University of Jerusalem participated in Experiment 2a; 27 were in the Future group, 33 in the Past group. Eighty-nine Introductory Psychology students at the Hebrew University of Jerusalem participated in Experiment 2b; 42 were in the Past condition, 47 in the Future. Forty-six students in an Introductory Methodology class at the University of the Negev participated in Experiment 2. They were equally divided between the two conditions.

Results

Power of manipulation. In Experiment 1 it was impossible to ascertain whether subjects had actually attended to the temporal setting of the outcomes they judged. The present design, however, affords a simple and effective test: noting the tense of the verbs appearing in the outcomes produced. Table 3 shows the proportion of subjects who used the wrong tense in each condition. For each experiment, although most subjects did respond properly

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Insert Table 3 about here
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to the temporal setting instructions, there was a clear tendency to transform postdictive into predictive tasks (i.e., to use the future tense for possible past outcomes). In each case, wrong tense responses were randomly distributed

over subjects, indicating that they were not produced by any subset of subjects who "missed" the instructions but by a large number of subjects who tended to "lapse" into prediction when postdiction was required.

H_1. Experiment 2a produced some slim support for H_e. The overall medians for Past and Future, respectively, were 12 and 10, 14 and 10, and 15 and 10, for the three events. The corresponding median medians for Past and Future subjects were 12 and 10, 12 1/2 and 12, and 14 and 10. Thus, in each case, Past outcomes were on the whole more likely than Future outcomes. For the third event, this difference was significant $(\chi^2(1) = 7.38;$ $p < .01;$ median test).

This support vanished in the remaining experiments. For both Experiments 2b and 2c, the overall medians and medians medians were essentially indistinguishable on the basis of temporal setting.

H_e. H_e predicts greater dispersion for past outcomes, indicating Past subjects' greater confidence in their ability to distinguish degrees of likelihood in the outcomes which they have produced. The most relevant measure of the dispersion of subjects' likelihood judgments is the mean (absolute) deviation of individual subjects' likelihood judgments for the various outcomes he had produced for each event. The means of individual subjects' mean within-event dispersion appears in Table 4. As can be readily seen, there are no consistent differences. Within-event dispersion was

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Insert Table 4 about here
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slightly larger for Past than for Future subjects in Experiment 2a, and slightly smaller in Experiments 2b and 2c. None of these differences are

significant. Combining these results as suggested by Winer (1962, p. 44)
yields $z = -.65$ ($= \sum_{i=1}^{k} t_i / \sqrt{k}$; where k = number of groups), also insignificant.

In no case does restricting attention to those events which had the largest proportion of correct tense responses, restricting attention to correct tense responses or treating future tense responses of Past subjects as having been produced by Future subjects, and vice versa, provides any additional support for either H_1 or H_e.

Effect of production. A number of analyses showed the judged likelihood of outcomes to depend upon the conditions under which they were produced. For example, the later an outcome is produced, the less likely it is judged. (the rank order correlations between likelihood and position of production for individual subjects had a mean of -.26 over groups). The same relationship was found within categories of similar outcomes produced by different subjects (see below). Subjects who produced any given outcome earlier tended to find it more likely (mean rank order correlation over outcome categories = -.17). In addition, the more outcomes subjects produced, the lower the median of their likelihood judgments (mean rank order correlation between number of outcomes produced and median likelihood judgment = -.27). The latter relation suggests a possible artifactual source of the small Past-Future difference which emerged in Experiment 2a. Future subjects might have assigned lower probabilities as a result of having produced more outcomes. This is not, however, the case, as Future subjects actually produced slightly fewer outcomes in both experiments where they were asked to produce as many outcomes as possible (2a and 2b).[2]

Outcome content.   Outcomes were categorized according to content in order to obtain further insight into Past-Future differences. Two questions asked were: (a) Do Past and Future subjects evaluate the likelihood of similar outcomes similarly? and (b) Do Past and Future subjects tend to produce different outcomes? The answer to the first question is a solid "no," to the second a tentative "yes."

Regarding question (a), for the event in the example above, there was a marked tendency for the medians of corresponding outcome categories to be more likely and more extreme for Past than for Future groups. There were, however, no systematic differences for the remaining two events of Experiment 2a, nor for the events of Experiments 2b and 2c. Regarding question (b), the distributions of Past and Future responses over the outcome categories were compared by chi-square tests following elimination of very small categories. The two distributions were significantly different (p < .001) for all three events in Experiment 2a, for one of the three in Experiment 2b, and for four of the seven in Experiment 2c. Impressionistic analysis of these differences indicated that Past outcomes tended to be more complex and imaginative than Future outcomes.

Discussion

Contrary to the sure past hypothesis, there is no consistent evidence that temporal setting affects either the central tendency (H_1) or the dispersion (H_e) of likelihood judgments, either for subject- or experimenter-

produced outcomes, for any of the varied events and tasks used here. The weak

effects obtained in Experiment 2a must, then, be considered a chance result in

light of the mass of contradictory evidence.

There is, however, evidence that temporal setting does affect the pro-

duction of possible outcomes—as reflected in: (a) the tendency to transform

postdictive tasks to predictive (i.e., the production of future tense Past

outcomes); and (b) the differing distributions of Past and Future outcomes

over categories for eight of the 13 events used. Temporal setting did not,

however, affect the number of outcomes which subjects were capable of

producing (Experiments 2a and 2b).

Aside from the evidence they provide on the effect of temporal setting

on likelihood judgments, these results provide some general insight

into how people perform such judgments. Tversky and Kahneman (1974) have

suggested two heuristics which judges might use in likelihood estimation

tasks like those used here; "availability" and "representativeness." The

availability-guided judge deems an outcome likely according to the ease

with which it is produced or imagined. The representativeness-guided judge

evaluates the likelihood of an outcome by the degree to which it appears to

be a natural outgrowth of the situation described.

The fact that temporal setting affects outcome production without

affecting likelihood judgments suggests that these likelihood judgements

rely on representativeness rather than availability—which should

be sensitive to changes in production. It is, in turn, highly plausible

that representativeness-guided judgment would be insensitive to temporal

setting. Not only is there no obvious way in which temporal setting would

change the perceived event description-possible outcome fit, but it has

been found that reliance on representativeness obscures such salient and

normatively important aspects of event descriptions as sample size and

base-rate probabilities (Kahneman & Tversky, 1972, 1973).

What remains to be explained is why some people believe in the "sure

past" hypothesis. The simplest explanation is that pastness is confused

with its ecological correlates, concomitants which do, in fact, generally

lead to greater judgmental confidence. One correlate of temporal setting

which may contribute to a "sure past" illusion is contemporaneous changes

in social realities. If human behavior is perceived to have been more

predictable and stable in the past than it will be in the future (another

claim advanced by Toffler), then pastness might well be misidentified as

allowing judgmental sureness.

A second, possibly more significant, correlate of temporal setting

is outcome knowledge. Judges looking at the past typically know "how it

turned out." With this additional knowledge, and the hindsight it confers,

judges are able to see and show the relative "inevitability" of past

events (Carr, 1961; Fischhoff, 1974; Fischhoff & Beyth, 1975; Nowell-Smith,

1970). Outcome knowledge seems to enable people to impose upon the past a

degree of certainty which they would not dare to impose upon the future.

The relative prevalence of outcome knowledge for past events may create

the mistaken impression that pastness alone is a sufficient condition

for uncertainty judgment. Past and Future subjects here, however, were

equally ignorant of the outcomes of the events they judged.

A third variable related to temporal setting may be degree of control.

One can do something about the future, but very little about the past.

Virtually all of the literature concerning perception of past and future

events (Doob, 1970) deals with events in the judges' personal past or future. Such personal involvement may give the future a feeling of openness or controllability which reduces judgmental confidence as it encourages phenomena like "magical thinking" (Rothbart & Snyder, 1970). Again it would not be pastness, but a correlate which produces greater confidence.

In conclusion, it may be worthwhile to consider the general paradigm which underlay the present studies and which seems to offer possibilities for fruitful interaction between psychology and other disciplines. A common sense observation routinely put forth and used by a number of scientists and philosophers of science has provided the impetus for investigation of a systemic variable of general psychological interest. Empirical analysis has, in turn, shown the inaccuracy of these anecdotal observations and suggested needed refinements. It has also been found, anecdotal reports to the contrary, that the temporal setting of events is a variable which does not have to be considered in the design and comparison of judgmental studies.

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2. Condry, J. Personal communication, October 3, 1973.

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Footnotes

[1]A third group which received future outcomes (as above) with future event descriptions (e.g., "A French artist is about to submit a claim . . .") was also included in this study. It allowed evaluation of the effects of changing the temporal setting of the event description as well as the outcome. Results for this group are not reported in detail here as it was eliminated from further experiments because of subjects' reported discomfort with future tense event descriptions. Responses to these items were indistinguishable from responses to the corresponding Past and Future items.

[2]Additional evidence of the dependence of likelihood judgments on aspects of outcome production emerged in Experiments 2b and 2c below. It is omitted for the sake of brevity here, but is available upon request.

Table 1

Examples of Stimuli Used

Experiment 1

Event:	The manager of a real estate firm decided that the company should expand its operations and begin not only to deal in property, but also to build homes. The first project he initiated was such a flop that it transformed the company's statement from profit to loss for that year.	An aging sprinter, a former champion, realized as the national championships approached that his chances to win were minimal, and that it was possible that he would not even reach the finals.	Two parents, she an American and he an Israeli, who live in Israel, decided that he (the father) would speak to their infant in Hebrew and that she would speak to him in English from birth.
Outcome judged:[a]			
Experiment 1a:	. . . the company's owners fired (will fire) the ineffective manager.	. . . he was (will be) sick at the time of the championships.	. . . the child began (will begin) to speak English as his first language.
Experiment 1b:	. . . the company's owners fired (will fire) the ineffective manager, cancelled (will cancel) his expansion plans, and appointed (will appoint) as new manager one of his aides who had opposed the plan.	. . . he was (will be) sick at the time of the championships, but denied (will deny) emphatically that he has left athletics for good.	. . . the child began (will begin) to speak English as his first language, but encountered (will encounter) severe speech difficulties upon entering kindergarten.

Event:

Joseph K. is a sixteen year old from a father-less home. In the course of the last three years he has been apprehended some five times for various misdemeanors. As a result, he spent a year in an institution for juvenile delinquents. Last summer he was caught, along with a professional criminal in the act of burglarizing a luxury apartment. At the trial he admitted his guilt. The prosecutor demanded his incarceration in a prison for adults. On the other hand, his probation officer asked to have Joseph placed in his custody for treatment. The judge recently handed down his decision (is about to hand down his decision).

Joseph and Sara L., both actors, agreed to separate after seven years of marriage. All the legal problems were settled quickly, except for the matter of the children: a five year old boy and a two year old girl. Neither parent wanted them as they would restrict his freedom of action. The matter was given to the court to decide.

Experiment 2b and 2c

Outcomes were provided by the subjects.

a Each outcome statement began: "In the light of these data, what, in your opinion, are the chances that . . . ." The phrases in parentheses appeared in the Future version of each stimulus.

Table 2

Mean Between-Event Dispersion

Experiment

		1a	1b
Condition	Past	3.18	4.76
	Future	3.57	4.57
	t	-1.45^a	0.68
	df	46	8C

[a]Negative sign for t test for difference indicates

results contrary to H_e.

Table 3

Tenses of Outcomes Produced

Tense Required (condition)

Tense Produced		Experiment 2a		Experiment 2b		Experiment 2c	
		Past	Future	Past	Future	Past	Future
	Past	92.9%	0%	78%	4%	89.9%	9.2%
	Future	7.1%	100%	22%	96%	10.1%	90.3%
	z^a	1.96		3.97		0.66	

[a]The difference in the proportion of subjects using the wrong tense in each condition.

Table 4

Mean Mean Within-Event Dispersion

Experiment

Event Condition	2a			2b			2c						
	1	2	3	1	2	3	1	2	3	4	5	6	7
Past	4.42	4.49	3.78	4.48	3.55	3.53	4.42	4.56	4.09	4.17	4.56	4.68	3.27
Future	4.21	3.92	3.71	4.62	3.80	4.16	4.66	4.81	4.13	4.14	4.63	4.99	3.52
t	0.53	1.47	0.03	-0.47[a]	-0.78	-0.72	-0.55	-0.54	-0.07	0.03	-0.17	-0.64	-0.49
df	58	58	58	87	87	87	41	41	41	41	41	41	41

[a]Negative sign for t test for difference indicates results contrary to H_e.